

IDAHO

DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

HAGERMAN FISH DISEASE LABORATORY

Jobs I, II

ANNUAL REPORT



Period Covered: 1 October 1981-30 September 1982

by

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HAGERMAN FISH DISEASE LABORATORY

Job I
ABSTRACT

During the period of this report (1 October 1981 to 30 September 1982), I visited most state hatcheries at least once to observe fish condition, health, and general hatchery practices. In addition, I responded to about 75 requests for diagnostic services to determine causes of excessive fish mortalities. Various diseases were diagnosed and appropriate treatments recommended. Also, trips were made to several hatcheries for tissue and ovarian fluid sampling to determine presence of viruses.

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OBJECTIVES

To monitor diseases and general health of fish at the 22 fish cultural installations operated by the Idaho Department of Fish and Game and prescribe treatment, if necessary.

To diagnose unknown diseases at hatcheries and to prescribe prophylactic disease control measures or medicine to effect cures.

To assist hatchery personnel in any way necessary to achieve the best finished product possible.

RECOMMENDATIONS

The Department should continue to insure that all hatcheries receive publications that are applicable to fish culture, such as "The Progressive Fish Culturist," and are updated on all fish health (both infectious and noninfectious diseases), prevention, control, and management techniques.

The Department should continue to sponsor meetings and orientations to all hatchery personnel as they relate to fish culture to keep workers aware of new innovations and techniques in this field.

.An effort should be made to determine optimum loadings at each hatchery and attempt not to jeopardize fish health by exceeding these densities.

An effort should also be made to determine if there is a correlation between the outbreaks of certain diseases at each hatchery with seasons of the year.

INTRODUCTION

The Idaho Department of Fish and Game operates 22 fish hatcheries, rearing ponds, and redistribution facilities which annually produce about 1.2 to 1.5 million pounds of fish (Fig. 1).

The project leader usually visits each hatchery at least once each year to routinely examine their fish for disease and general health. He is also available on an as-needed basis. If disease is encountered, it is diagnosed and steps for a cure are prescribed. Hatchery management practices are also evaluated as they relate to fish health.

The project leader is on call to make an emergency call to any hatchery that develops a disease problem during the year.

The Department purchases a portion of their fish and fish eggs from other states or commercial sources. The project leader inspects these eggs and fish for disease prior to acceptance by the Department.

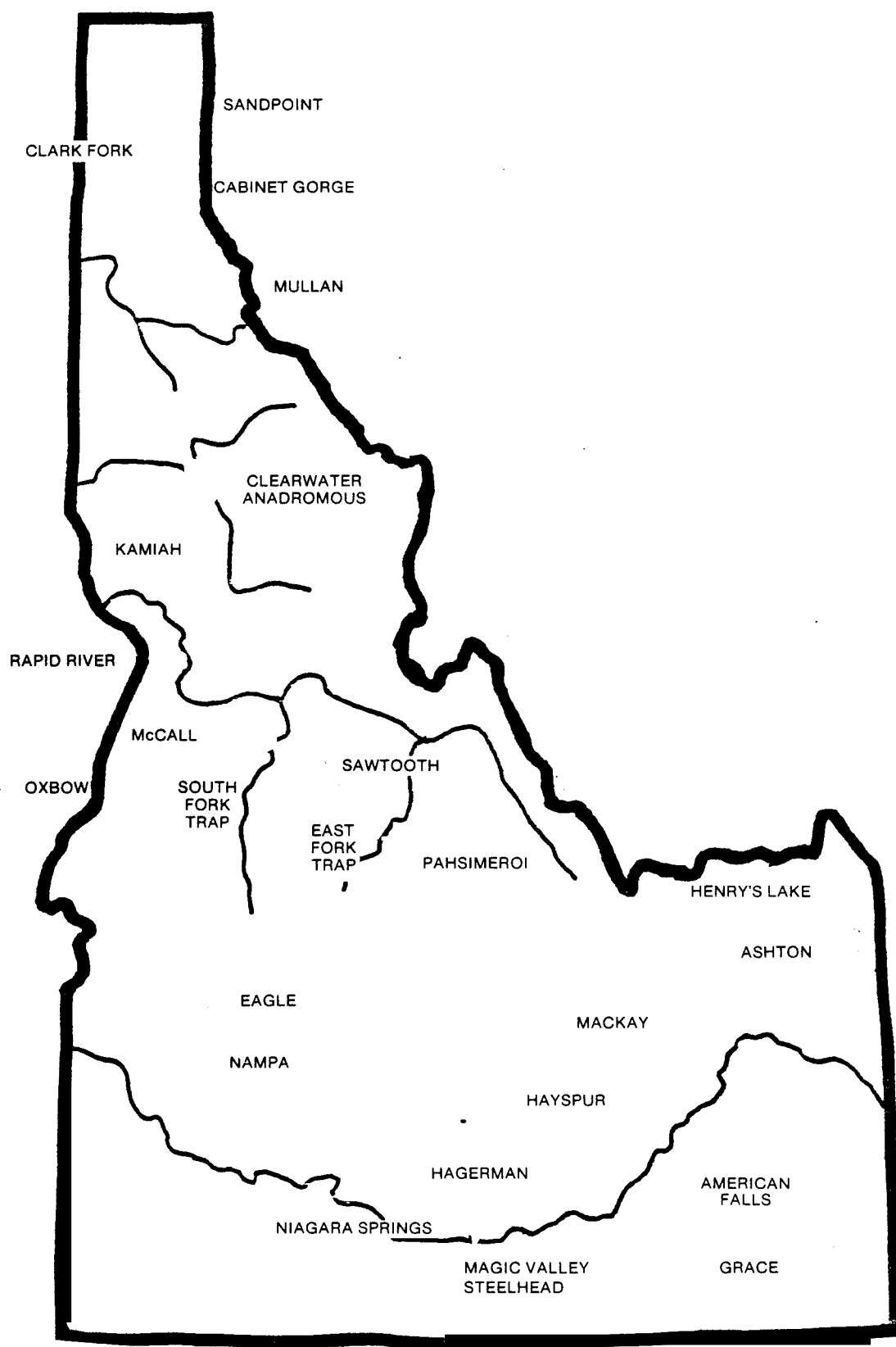


Figure 1. State operated trout and salmon hatcheries, fish redistribution stations and rearing ponds.

Fish feed samples are taken and analyzed for nutrient values and quality control.

Water supplies are frequently analyzed for chemical

characteristics. TECHNIQUES USED

The Department maintains a small laboratory located at the Hagerman Hatchery. This laboratory is equipped to provide facilities and support services where most fish diagnostic work can be accomplished.

Necropsy procedures and diagnoses are based on standard methods established by the Fish Health Section of the American Fisheries Society and publications of research workers. Occasionally, assistance is given by other state, federal, and private laboratories.

Occasionally, dual infections are present and no attempt is made to isolate individual species if treatment is the same for both species.

FINDINGS

There were about 75 requests for diagnostic services to determine causes of excessive fish mortalities at state hatcheries from 1 October 1981 to 30 September 1982. There were another five examinations made on fish at nonstate hatcheries or other water supplies. These calls were for major problems only, and do not include minor examinations or managerial and environmental problems. There were also a number of visits for sampling tissues and ovarian fluids for virology that are not included. Many of the problems required more than one visit, and in some cases, recurrences of disease happened at a later date.

A summary of the general operation, location, production and diagnoses of each fish cultural station follows:

American Falls Hatchery

American Falls Hatchery is located in Power County near American Falls. This station is primarily a rainbow trout hatchery and brood stock station, but also produces a significant number of other species. Production for the period 1 October 1981 to 30 September 1982 was 143,000 pounds. Several trips were made to this hatchery during the year for virology samples and diagnostic examinations on several different lots and species of fish. Findings include the following:

Virus	-Infectious Hematopoietic Necrosis (IHN)	}	
Bacteria	- <u>Flexibacter</u> <u>sp.</u>	}	Systemic
Parasites	- <u>Costia</u> <u>sp.</u>	}	Infections
Miscellaneous	-Gas bubble disease	}	

Fish were treated with appropriate medicated feeds and chemical flushes when necessary. No treatments were recommended in the cases of viral infections. This station was taken out of production in September 1982 for major reconstruction which will be completed in about one year.

Environmental problems are prevalent at this station because of hatchery design, and there is a definite need to redesign and reconstruct this station to overcome the obvious inadequacies and restrictions inherent at this facility.

Bird predation, mainly by gulls, blue and night herons, are also cause for concern. Consumption by birds represents considerable losses in fingerlings, and the potential of disease transfer is always a threat, not only intra-hatchery, but inter-hatchery or water supplies. Thus far, bird wires and scare-away devices have largely been ineffectual.

Ashton Hatchery

Ashton Hatchery is located in Fremont County near Ashton. Ashton is primarily a rainbow trout station, but also produces cutthroat trout and coho salmon. Planted production for the period 1 October 1981 to 30 September 1982 was 36,310 pounds. No fish examinations were made at this station during the year. External parasites, while present most of the time, do not appear to cause many mortalities.

Clark Fork Hatchery

Clark Fork Hatchery is located in Bonner County near Clark Fork. This station rears rainbow, cutthroat and Kamloops trout and kokanee salmon. Planted production was 18,000 pounds from 1 October 1981 to 30 September 1982. Fish exams showed systemic bacterial infections, external parasites and dietary problems. Viral and bacterial inspections of adult kokanee were negative. Cutthroat trout were suspected and later confirmed of harboring IPN virus.

Decker Rearing Pond

This pond was not used for fish rearing during this time period because of an eye fluke problem and lack of funding. It is, however, the site for a new mitigation hatchery by the Corps of Engineers to rear spring chinook and trap and spawn steelhead trout. Construction of the new Sawtooth Hatchery is to start in 1983 and completion by 1984, with a production of about 149,000 pounds. Trapping and spawning of chinook salmon has occurred at this site for the past two years.

Eagle Hatchery

Eagle Hatchery is located in Ada County near Eagle. Most production is rainbow trout, but they also raise cutthroat, brown, brook trout and

kokanee salmon. Planted production for 1 October 1981 to 30 September 1982 was 29,400 pounds. Exams during the year revealed a high incidence of eye loss in brown trout. This seems to be characteristic of this species and is attributable to their cannibalistic and picking nature. Water supplies are low and gas saturation is a continuing problem.

Grace Hatchery

Grace Hatchery is located in Caribou County near Grace. This station primarily produces rainbow and cutthroat trout. Planted production from 1 October 1981 to 30 September 1982 was 104,000 pounds. Several exams during the year showed the fish to have a systemic bacterial infection of Aeromonas and/or Pseudomonas sp., gill dysfunction due to hyperplasia and bacterial gill disease.

Hagerman Hatchery

Hagerman Hatchery is located in Gooding County near Hagerman. This is the state's largest producer of catchable rainbow, with annual production from 1 October 1981 to 30 September 1982 of 272,000 pounds. This figure includes production of other species as well. Many exams of the various lots of fish were made, and the results included the following:

Virus	-IHN
	- IPN Bacteria <u>-Aeromonas</u> and/or <u>Pseudomonas</u> sp.
	- Columnaris
	- Gill disease
	-ERM
	- Furunculosis
Other	-Coagulated yolk sac
	- <u>Costia</u> sp.
	- Fungus
	- <u>Hexamita</u> sp.
	- PKD

Afflictions were treated with appropriate chemical flushes and/or medicated feed. In the cases of viral infections, no treatments were initiated.

Predation by fish-eating birds is prevalent at this hatchery and comments in the American Falls section also apply here. Half of Hagerman's raceways are covered with bird wires and do a good job in preventing intrusion by sea gulls. The balance of the project needs completion.

Proliferative kidney disease (PKD) has been a problem in cultured fish in Europe for many years. In December, 1981 the first confirmed isolation of PKD in North America was made at the Hagerman Hatchery. Approximately 800,000 fish, mostly rainbow trout, were destroyed in an attempt to prevent further spread of the disease. Complete hatchery disinfection was completed early in 1982 using 200 ppm chlorine. The hatchery was restocked, but on about July 1, 1982, the PKD organism was

again detected. Fish were not destroyed this time, but released as catchables in certain carefully selected locations. In the first episode it is generally accepted that PKD was causing most of the mortalities. However, in the second episode, it is generally considered that PKD played a minor role in the mortalities. One to several fish pathogens were present in both episodes. Studies are on-going by University of Idaho personnel.

Hayden Creek Hatchery

Hayden Creek Hatchery is located in Lemhi County near Lemhi and has been operated in the past as a research station for spring chinook and steelhead. Production from 1 October 1981 to 30 September 1982 was 1,563 pounds. I observed bacterial gill disease in slides sent to me in kokanee salmon. This station was turned over to University of Idaho personnel for operation on about July 1982.

Hayspur Hatchery

Hayspur Hatchery is Idaho's oldest hatchery and is located in Blaine County near Bellevue. Hayspur is primarily a rainbow trout production and brood station, but occasionally rears other species. Production from 1 October 1981 to 30 September 1982 was 105,000 pounds. There were no exams at this station during the year, but I did observe Trichodina sp. in low numbers in gill tissue on fish transferred to Hagerman Hatchery..

Henrys Lake Hatchery

Henrys Lake Hatchery is located in Fremont County north of Ashton. This station is a cutthroat trout egg-taking hatchery. About 500 pounds of cutthroat fry were hatched, reared and released into the lake during the planting period 1 October 1981 to 30 September 1982. No fish exams were made during the year.

Kamiah Redistribution Station

The Kamiah facility is located in Lewis County near Kamiah. This station is used as a depot for redistribution of catchable rainbow trout that are raised at Hagerman. No visits were made to this station during the year.

Mackay Hatchery

Mackay Hatchery is located in Custer County near Mackay. During the planting period from 1 October 1981 to 30 September 1982, this station had released 122,000 pounds of various species, mostly rainbow trout. No request for diagnostic services were received during the year.

McCall Hatchery

McCall Hatchery is located in Valley County at McCall. Planted production from 1 October 1981 to 30 September 1982 was 23,250 pounds

of summer chinook and 1,725 pounds of cutthroat trout. This station also redistributes catchable rainbow trout from Hagerman. Viral checks on chinook were negative and observations noted the presence of bacteria and Hexamita sp. in cutthroat trout.

Mullan Hatchery

Mullan Hatchery is located in Shoshone County east of Mullan. Planted production from 1 October 1981 to 30 September 1982 was 2,700 pounds of several species. No fish exams were done during the year.

Nampa Hatchery

This hatchery is a recent acquisition by the Department from a commercial trout producer. It's located in Canyon County south of Nampa. Production was 103,500 pounds of mostly rainbow trout during this report period. Disease problems noted were IHN virus and ERM.

Niagara Springs Hatchery

Niagara Springs Hatchery is located in Gooding County south of Wendell and is under sponsorship of Idaho Power Company for their mitigation requirements for their complex of three dams on the Snake River. Planted production from 1 October 1981 to 30 September 1982 was 347,000 pounds of steelhead trout. A number of visits were made to this station and IHN virus was confirmed and caused heavy losses. Other pathogens noted were Myxidium sp., sunburn, bacteria, Sanguinicola sp., Costia sp. and Hexamita sp.

Oxbow Hatchery

Oxbow Hatchery is located on the Snake River in Oregon. This Idaho Power Company station is used as a collection, holding and spawning area for adult steelhead that return to Hells Canyon Dam. There was 358 pounds of kokanee produced during the year. Bacterial gill disease and Costia sp. were observed in these kokanee.

Pahsimeroi Hatchery

Pahsimeroi Hatchery is located in Lemhi County northeast of Challis. This Idaho Power Company hatchery is mainly a steelhead trout egg-taking station for the Niagara Springs Hatchery. Production was 12,500 pounds of spring chinook. Fish exams noted the presence of IHN and IPN viruses in adult steelhead, bacterial gill disease, coagulated yolk sac and Epistylus sp. We are continuing experiments regarding water hardening eggs is a Wescodyne solution.

Rapid River Hatchery

Rapid River Hatchery is another Idaho Power Company station and is located in Idaho County near Riggins. This is a spring chinook

hatchery, and they released 89,280 pounds from 1 October 1981 to 30 September 1982. This station has had a long history of kidney disease (KD), but the use of erythromycin phosphate in water hardening of eggs and injection of adults has significantly reduced KD outbreaks in pre-spawners and juveniles. Annually, there are losses during the spring months which have never been explained and this year was no exception. These losses have been designated in the past as "drop-out syndrome" or "spring thing", for lack of better terminology. Efforts to isolate causative agents have been largely ineffectual. There is some indication that improvements **in** the diet has reduced the losses at this station and experiments are continuing. Pathogens observed during the year were coagulated yolk sac, "spring thing", Hexamita sp. and IHN in the adults

Red River Rearing Pond

This facility is located in Idaho County near Elk City. This station raised spring chinook for release in the upper South Fork Clearwater drainage. I did not visit this pond during the year.

Rochat Rearing Pond

This pond has been used to rear westslope cutthroat trout in the past. I did not visit this pond during the year.

Sandpoint Hatchery

Sandpoint Hatchery is located in Bonner County near Sandpoint. Planted production from 1 October 1981 to 30 September 1982 was 4,147 pounds and includes several species. Hexamita sp. was observed on one examination.

MISCELLANEOUS

I examined rainbow from Batise Springs (Valley Trout Co.) for purchase by Idaho Power Company for release in American Falls Reservoir. Bacterial isolations were accomplished, but considered of minor importance.

Adult kokanee from Anderson Ranch Reservoir were surveyed for viruses and found to be negative.

Fall chinook salmon from the Hagerman National Hatchery were examined and found to have coagulated yolk sac and a systemic bacterial infection of Aeromonas sp. and/or Pseudomonas sp. Also a request was made to examine two lots of steelhead on a fish quality and health basis. The large steelhead were on demand feeders and averaged 315 mm with little, if any, appearance of health problems. The smaller steelhead were being hand fed and averaged 200 mm with no significant health problems. This group did have much more descaling.

IMMUNIZATIONS

The Department has continued with the program to vaccinate rainbow trout at stations with a history of red-mouth disease (ERM). Fish are immunized with bid contract bacterin and employ a shower apparatus when fish are about 30 per pound. All hold-over rainbows at American Falls, Eagle, Hagerman and Nampa have been immunized, and to date, no outbreaks of ERM have occurred.

Vibrio vaccinations were completed at Niagara Springs, Rapid River and McCall early in 1982. Hopefully, this program will continue for at least two more years. This should allow for evaluations of return data to determine whether immunized fish survive and return to Idaho better than nonimmunized fish. The anadromous fish are susceptible to vibrio disease during their stay in the ocean and these vaccine tests will provide information on both chinook salmon and steelhead trout.

HAGERMAN FISH DISEASE LABORATORY

Job II
ABSTRACT

In compliance with the provisions of the Federal Water Pollution Control Act, fish hatcheries are authorized to discharge, under the National Pollutant Discharge Elimination System (NPDES), a restricted amount of settleable and suspended solids to receiving waters. Monitoring of these and other parameters is required. Removal of settleable solids is needed to achieve final limits of permits. Reports of findings and data storage are also required by federal law. During the period of 1 October 1981 to 30 September 1982, we monitored effluent discharges at the 12 state fish hatcheries that fall under these criteria.

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OBJECTIVES

To monitor the effluent from 12 state fish hatcheries to insure effluent meets limitations imposed by the Environmental Protection Agency (E.P.A.) through National Pollutant Discharge Elimination System (N.P.D.E.S.) permits.

RECOMMENDATIONS

Continue monitoring hatchery effluents.

Complete construction of settling systems where needed.

TECHNIQUES USED

The Environmental Protection Agency (E.P.A.) requires pollutant discharge permits for fish hatcheries which produce 20,000 pounds of fish or more during the year.

The Idaho Department of Fish and Game operates 12 fish hatcheries which require permits: American Falls, Ashton, Clark Fork, Eagle, Grace, Hagerman, Hayden Creek, Hayspur, Mackay, Nampa, Niagara Springs* and Rapid River*.

Parameters required by permits include settleable solids, suspended solids and water flows. Frequencies of samples and sample types vary from station to station, but generally are taken on a weekly basis. Samples are taken on incoming waters, outflows, cleaning and noncleaning situations.

Filters from each hatchery are analyzed by a commercial laboratory and results are recorded and filed. Laboratory costs are billed against the individual hatcheries.

Monthly reports are recorded and quarterly reports are submitted to E.P.A.

If violations occur, additional written communication is filed to E.P.A. stating nature of violation, causes and steps taken to prevent a recurrence.

Techniques are based primarily on established procedures set forth by "Standard Methods for Examination of Water and Wastewater".

In accordance with N.P.D.E.S. permits, water samples are checked for concentrations of settleable solids and suspended solids. Settleable solids are measured in an Imhoff cone and readings are taken on material settled out after one hour. Suspended solids are determined by filtering sample through preweighed filters, oven-dried and again weighed to obtain net gain.

*Idaho Power Company owned.

FINDINGS

We found that all readings for settleable and suspended solids fell within the limits of the permits during normal hatchery operations. However, during cleaning operations, settleable solids may exceed limitations if no settling facility is present.

Compilation of settleable and suspended solid concentrations is presented in Tables 1 and 2, as well as in Figures 2 and 3. Flow in cubic feet per second (cfs) are presented for each hatchery in Table 3.

DISCUSSION

At the inception of the N.P.D.E.S. permits, one set of sampling gear was purchased to monitor hatchery effluents. This necessitated almost constant travel to the hatcheries involved. Subsequently, sampling gear for each hatchery was provided and personnel were instructed as to usage and recording.

Several modifications have been made on original permits by E.P.A. and has resulted in slightly reduced sampling. After over two years of intensive sampling, E.P.A. has determined the area which efforts need to be concentrated in terms of pollution abatement is the settleable solids discharge.

Idaho Department of Fish and Game has completed major construction projects at Ashton, Grace, Hagerman, Clark Fork and Hayspur hatcheries to create settling lagoons for all hatchery effluent. Idaho Power Company has constructed a settling lagoon at the Niagara Springs site. Future construction may be needed at the Hayden Creek and Mackay facilities.

Table 1. Maximum settleable solid concentrations (ml/l) at Idaho hatcheries, 1 October 1981 to 30 September 1982.

Station	Settleable solid concentrates											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Amer. Falls	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Recon- struction
Ashton	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Clark Fork	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Eagle	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Grace	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hagerman	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hayden Creek	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	Operated by Univ. of ID		
Hayspur	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mackay	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nampa	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Niagara Sp.*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Rapid River*	< 0.1	< 0.1	< 0.1	<0.1	<0.1	<0.1	<0.1	<0.1	< 0.1	<0.1	<0.1	<0.1

*Idaho Power Company owned.

Table 2. Maximum suspended solid concentrations (mg/l) at Idaho hatcheries, 1 October 1981 to 30 September 1982.

Station	Suspended solid concentrates											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Amer. Falls	1.7	1.1	1.4	2.2	4.4	2.9	1.5	0.6	1.1	1.7	1.2	Recon- struction
Ashton	1.8	3.4	4.0	3.5	3.3	1.2	4.4	3.6	4.3	2.3	2.9	0.4
Clark Fork	0.9	0.2	0.7	3.8	2.7	2.6	2.8	7.8	1.1	3.3	0.3	1.2
Eagle	0.4	1.6	2.6	0.8	6.8	9.1	1.0	2.4	1.2	1.5	3.1	1.5
Grace	4.3	0.2	4.1	4.4	2.9	4.5	3.4	3.0	2.2	2.1	2.0	1.9
Hagerman	1.3	5.2	3.7	3.1	12.0	3.3	2.2	2.4	1.8	1.6	1.5	1.5
Hayden Creek	0.2	0.2	6.3	2.9	0.3	2.9	14.5	5.4	5.0	Operated by Univ. of ID.		
Hayspur	4.0	3.3	10.9	11.1	1.7	3.5	0.3	1.2	0.9	5.2	1.4	2.1
Mackay	0.4	0.4	0.2	2.0	0.3	0.7	0.9	1.9	1.0	0.5	1.9	2.0
Nampa	-	-	-	-	-	2.0	2.3	2.4	2.0	2.8	4.1	2.4
Niagara Sp.*	5.9	5.6	10.1	8.9	3.2	13.7	5.8	4.6	1.9	1.0	0.3	0.7
Rapid River*	0.2	1.7	3.2	2.7	2.2	1.9	3.2	13.0	9.2	21.9	3.0	2.0

*Idaho Power Company owned.

Table 3. Hatchery flows (cfs) at Idaho hatcheries, 1 October 1981 - 30 September 1982.

Station	Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
Amer. Falls	16	16	16	16	16	16	16	16	16	16	16	Recon- struction
Ashton	6	6	6	6	6	6	6	6	6	6	6	6
Clark Fork	8	10	10	10	12	12	12	10	10	12	8	6
Eagle	2.7	2.7	3	3	3	3	3	3	3	3	3	3
Grace	14	14	12	12	10	10	11	12	13	14	21	20
Hagerman	90	96	90	10	35	35	71	82	92	93	94	74
Hayden Creek	13	13	10	10	10	10	10	10	10	Operated by Univ of ID		
Hayspur	21	24	24	24	19	24	21	26	23	24	21	23
Mackay	22	22	22	22	22	22	22	22	22	22	22	22
Nampa	-	-	-	-	-	36	35	35	35	35	35	35
Niagara Sp.*	90	86	90	92	85	85	85	10	20	25	25	65
Rapid River*	12	12	15	15	15	22	14	14	20	30	30	25

*Idaho Power Company owned.

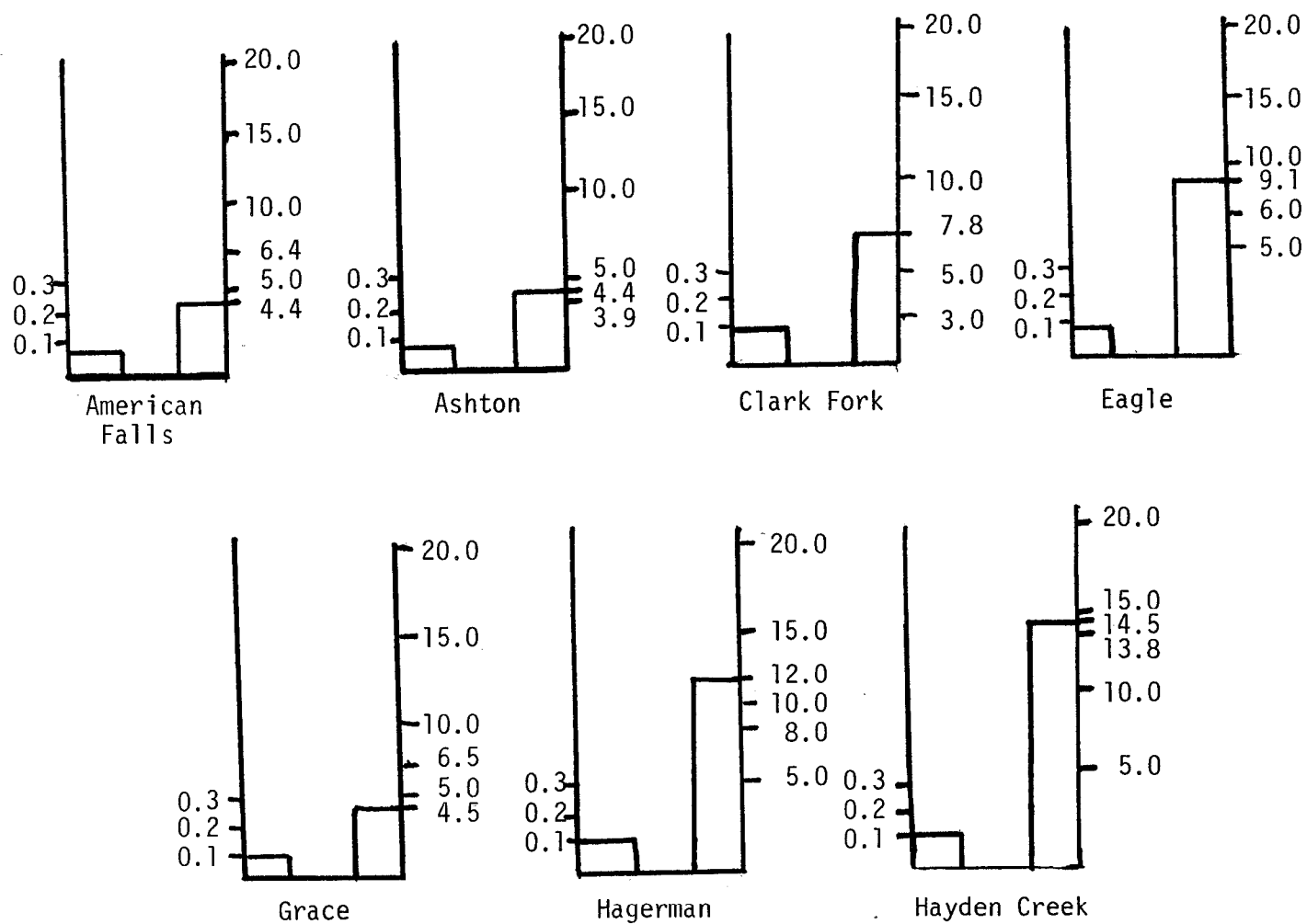


Figure 2. Maximum concentrations attained for settleable and suspended solids during 1 October 1981-30 September 1982 at American Falls, Ashton, Clark Fork, Eagle, Grace, Hagerman, and Hayden Creek hatcheries (settleable solids, ml/l, in left bar, and suspended solids, mg/l, in right bar).

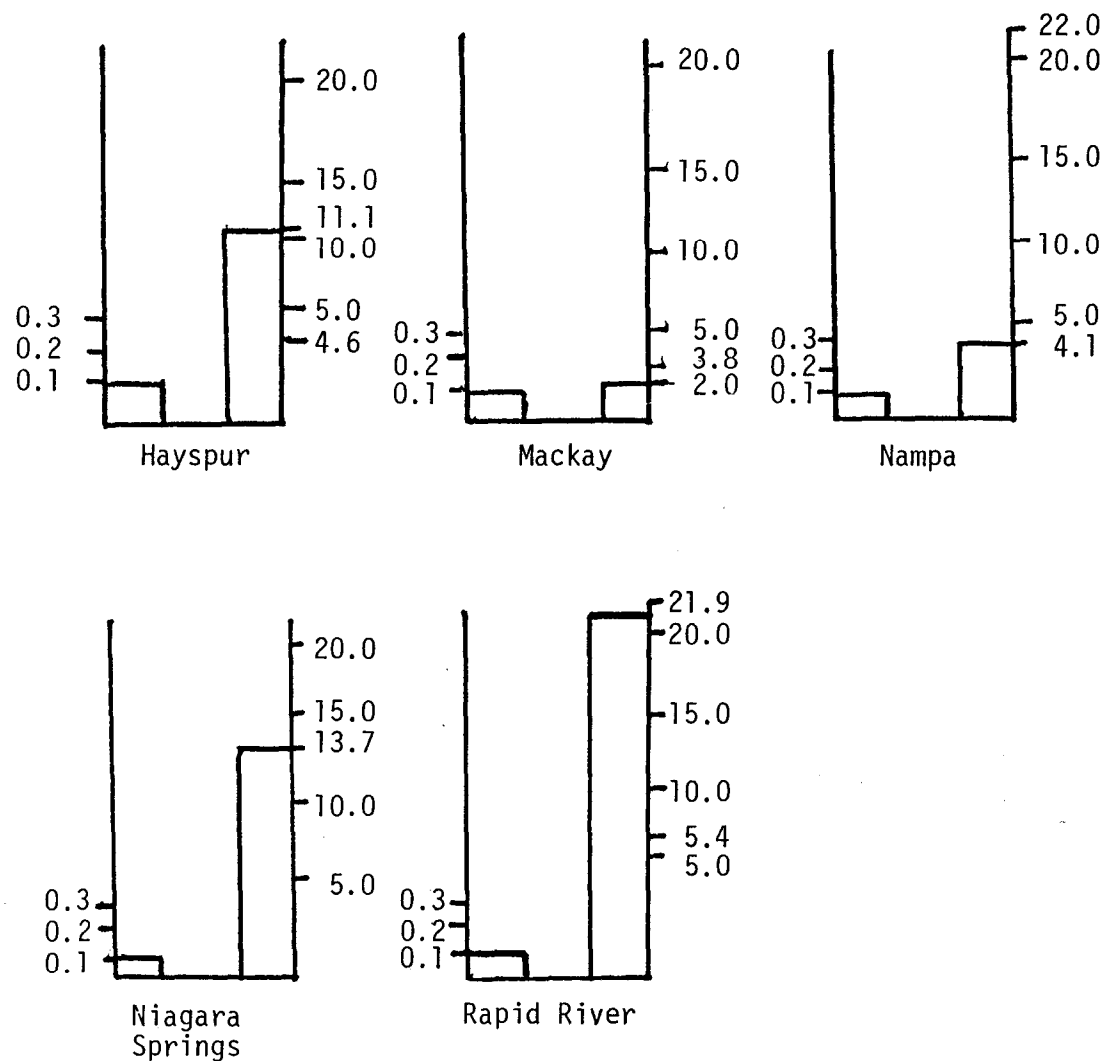


Figure 3. Maximum concentrations attained for settleable and suspended solids during 1 October 1981-30 September 1982 at Hayspur, Mackay, Nampa, Niagara Springs, and Rapid River hatcheries (settleable solids, ml/l, in left bar and suspended solids, mg/l, in right bar).